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ABSTRACT

This paper highlights the main features and proposed advantages of competency-based vocational education (CBVE) through an examination of three competency-based programs n operation. The programs examined are those of Holland College, Charlottetown, Prince Edward Island, Canada; Northeast Metro Technical College, White Bear Lake, Minnesota; and Richmond College of Technical and Further Education, Victoria, Australia. Data were gathered during site visits in 1988 and 1989. The paper first defines competency-based vocational education and outlines its characteristics through a review of literature. It then examines the three colleges' programs and describes their teaching systems, instructional materials, and curricula. Based on observation of the three programs, the paper offers some implications: (1) competency-based instruction has potential for training in both industry and colleges; (2) the self-pacing aspect appears to develop characteristics of independence and self-reliance; (3) a number of inherent problems and potential pitfalls in the CBVE approach need to be addressed; (4) adequate learning materials and resources are essential; (5) staff development must be an integral part of the program; and (6) learners must be prepared for change from the traditional approach to a CBVE approach. (KC)

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COMPETENCY-BASED VOCATIONAL EDUCATION AND SELF-PACED LEARNING

Anthony Watson

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FACULTY OF ADULT EDUCATION

COMPETENCY-BASED VOCATIONAL EDUCATION

AND

SELF-PACED LEARNING

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COMPETENCY-BASED VOCATIONAL EDUCATION AND SELF-PACED LEARNING

INTRODUCTION

In recent years, there have been repeated calls from Government, unions and employer groups in Australia for reform of our vocational education arrangements and methods of skills training (Dawkins, 1989, p. iii). These pressures have been made more immediate and urgent by the need to underpin the ambitious program of award restructuring already under way. The importance of developing a more highly skilled and adaptable workforce is now widely recognized.

Furthermore, these calls for reform have often been expressed in terms which are somewhat new or unfamiliar. There have been many references to so called competency-based instruction and more flexible self-paced methods of training.

The working party established by the Department of Labour Advisory Committee (DOLAC) to examine competency-based approaches to training for the trades called for the adoption of "competency-based instruction and assessment in all basic trade courses including the incorporation of a broad-based modular curriculum and self-paced instruction where appropriate" (DOLAC Report, 1988, p. 19).

In his white paper entitled: *'Improving Australia's Training System'*, John Dawkins argues that the award restructuring process currently in train, requires that training systems should provide, amongst other things:

- an increased emphasis on demonstrated competence rather than time served; and
- more flexible, broadly-based and modular approaches to training.

(April 1989, p. iii)

More recently the Management Review of the NSW Education Portfolio, in its report on *'TAFE Restructuring'*, has called for an improved response from TAFE to the *"fast changing industrial training and competency needs ... through more flexible access to course modules, self-paced learning and industry-located courses"* (September 1989, p. 8).

All of this represents a considerable challenge to teachers in TAFE as well as trainers in industry charged with the responsibility of implementing these innovations. In order to implement the changes successfully, those responsible need to know more about the nature and essential characteristics of competency-based instruction and its links with self-paced learning. They also need to understand the procedures, facilities and resources required for this approach to be effective. Awareness of the associated pitfalls and problems is also desirable. Teacher educators moreover need to adopt methods which will more adequately prepare teachers and trainers to develop and work with competency-based and self-paced programs.

The objective of this paper then is to clarify the main features and proposed advantages of competency-based vocational education (CBVE) and to extend our understanding of this form of training through an examination of ***three*** competency-based programs in operation. The programs are offered by the following colleges.

- Holland College, Charlottetown, PEI, Canada.
- Northeast Metro Technical College, White Bear Lake, MN, USA.
- Richmond College of TAFE, Victoria, Australia.

The programs are well regarded with long standing reputations and have been in operation since the 1970's. They were investigated by the author during visits to the colleges in 1988 and 1989.

The paper will analyse and evaluate each program and endeavour to isolate and identify the procedures, resources and facilities required to make CBVE successful. The link with self-paced learning will be highlighted. Implications will be drawn for TAFE and training in industry as well as for teacher education.

WHAT IS COMPETENCY-BASED VOCATIONAL EDUCATION ?

Competency-based vocational education (CBVE) is similar to performance-based teacher education which is reasonably well known. As with this approach to teacher education, CBVE requires that the knowledge, skills and attitudes (competencies) to be taught in a vocational program are those required by workers to perform successfully in the related job or occupation. This usually involves a series of learning experiences that include background information, practice and performance of the required skills in an actual or simulated work setting.

The basic characteristics of CBVE have been defined as follows:

i. Role-relevant competencies that include standards are identified and stated.

ii. Competencies are specified to students prior to instruction.

iii. Criterion-referenced measures are used to measure the achievement of competencies.

iv. A system exists for documenting the competencies achieved by each student.

(Horne, 1982, pp 3-4)

In addition, in order to achieve maximum flexibility, CBVE usually incorporates some form of ***individualised*** or ***self-paced learning.***

The following characteristics are seen as desirable:

i) Individualised materials and methods are used in instruction.

ii) Learning time is flexible.

iii) Learning is guided by feedback.

(Horne, 1982, pp 5-6).

One of the questions which often arises about competency-based learning is :'what is a competency?' Hermann, in his account of competency-based vocational education, defines competency as *"a performance capability needed by workers in a specified occupational area"* (1990 p.46). For example, the community expects automotive mechanics to competently repair brakes and engineers to design safe bridges. Hermann also points out that competencies may be *cognitive, attitudinal* and/or *psychomotor* and makes the important distinction that a competency does not imply perfection: *"It implies performance at a stated level or criterion (which)*

needs to be specific for each occupational area". (1990, p.46).

Hermann goes on to provide a comprehensive account of the rationale for and main features of CBVE. One of the features which is highlighted is the link with self-paced learning. *"The most common aspect of individualisation in CBVE programs is self-pacing (which is) characterised by allowance being made for students to move through a course at different rates"* (Hermann, 1990 pp. 53-54). In other words, CBVE normally allows students to acquire the specific competencies more or less at their own pace through the use of a variety of self-paced learning strategies and materials and with frequent feedback.

CBVE is very much a reality in the United States of America and Canada. Since the early 1970's in these countries many secondary and post-secondary institutions have developed CBVE programs. Some states have policies requiring the adoption of CBVE curricula in state aided institutions and many state authorities see CBVE as the primary means of providing more effective vocational education and training for youths and adults alike.

Courses offered by the CBVE mode range from standard two year technician level associate degree and trade level courses to short entry level skills training courses. They also include academic upgrading and basic adult education courses. Students in the courses include school leavers seeking vocational qualifications, young unemployed adults seeking job skills as well as older students seeking updating and retraining.

The courses are generally taught wholly or partly through the use of flexible self-paced methods and materials.

The rationale for competency-based learning includes claims that it is more cost effective, more relevant, more flexible and more self-satisfying than traditional forms of vocational education. It is argued that because competency-based programs are so closely based on specific job requirements, this ensures that students are taught the relevant and current skills required for employment. This aspect is enhanced when local industry, commerce and advisory bodies are involved in the development of curricula.

In addition, it is claimed that the self-paced learning and individualised methods associated with most CBVE programs tend to develop habits of self reliance and

independence so beneficial in gaining and holding employment. These methods also appear more suitable for adults who bring to the courses widely divergent ability levels and anxieties about learning in traditional class groups. The self-pacing aspect, moreover, allows open-entry, open-exit policies to be followed by most institutions which in turn allows adults to adjust course requirements to fit their other commitments and allows graduates to move onto the job market at various times throughout the year.

There are, of course, some examples of CBVE in Australia. Perhaps the most well known are the programs offered by the Richmond College of TAFE in Victoria. This college offers a wide range of automotive trade related courses as well as community courses which are all competency-based and all taught by the self-paced mode. They have developed a variety of self-paced formats including computer-based learning and employ an effective computer-based student management and reporting system. Croydon Park College in South Australia has introduced CBVE in panelbeating on a somewhat smaller scale. Reviews of these and other programs have been provided by Pearson (1983), McDonald (1984), Harris et.al. (1985, 1987), and Hermann (1990).

However, competency-based and self-paced learning have not really taken the educational world by storm in Australia. Some states have appeared very reluctant to adopt these approaches in vocational education. This has been particularly true of New South Wales, where the recent report on TAFE Restructuring observed that *"TAFE (in NSW) has not addressed self-paced learning modes in any comprehensive manner"* (1989, p. 27).

This may of course be due to the fact that many teachers and others responsible for training are genuinely unconvinced about the values and merits of competency-based education. Research findings after all have so far been rather unconvincing (Harris et al., 1985, 1987). It may also be due, in part, to the fact that teachers, trainers and administrators, as well as teacher educators, are somewhat uncertain about the procedures and materials required to make such a system effective.

Consequently an examination of CBVE programs in operation may serve to clarify our thinking concerning the advantages and disadvantages of this system as well as focussing on the processes and products required to implement such a system effectively.

CBVE AT HOLLAND COLLEGE

Holland College was established in 1969 by the Province of Prince Edward Island with a clear mandate to provide Islanders with alternative programs at the post-secondary level. The primary mission of the college has been *"to provide a broad range of educational opportunity in the fields of Applied Arts and Technology, Vocational Training and Adult Education"* (Holland College Act, 1974).

From the outset the faculty adopted certain principles of teaching and learning which were to lead them to adopt a competency-based approach. These included the following:

- skills required in an occupational field shall be identified by persons in the field;
- instruction should reflect the fact that learning is a personal and voluntary act and that students learn at different rates and in different ways;
- students are responsible for their own progress and instructors are accountable for student progress;
- programs shall be individualized (personalized) to the full extent that resources allow;
- students shall be able to enter and exit from a program at any time.

(Holland College , 1983)

The competency-based approach to instruction developed at Holland College, based on these principles, is called **STEP** (Self-Training and Evaluation Process) and its objective *"is to help learners assume responsibility for their own development while acquiring the skills needed to enter wage-earning employment"* (Holland College Booklet, 1983, p.1). The approach has been in operation since the early 1970s and is currently used to teach all courses in four major schools and across the twelve campuses of the college. The college also has its own competency-based program for instructors called **Learning Management** which all instructors are expected to complete in their own time and at their own pace. The comments made in this paper are based on visits to six of the campuses and observation of the programs in operation and interviews with students and staff in a variety of courses. These courses included Business Administration, Accounting, Office Administration, Cookery, Fisheries Technology, Marine Engineering, Construction, Computer, Automotive and Electronics Technology, Welding, Automotive Mechanics and Motor Vehicle Repair.

The competency-based (STEP) system at Holland College is built around four basic features or elements.

1. Occupational Analysis

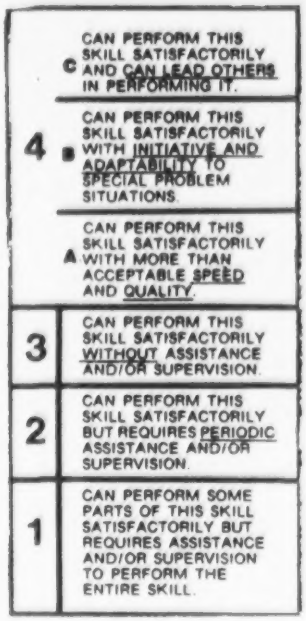
Each program is based on a careful analysis of the appropriate career field or occupation. The analysis is usually carried out by means of a 2 - 3 day workshop using a process such as DACUM (Developing a Curriculum). The outcome is a career profile which sets out major areas of competence within a field and specific skills or competencies required by each of these areas arranged in a sequence (see the profile for Business Administration in Figure 1). Each profile is accompanied by a rating scale which sets out performance criteria for each skill (see Figure 2). These competencies then become the basis of each occupational program.

Figure 1. Profile for Business Administration

	1	2	3	4	5	6	7
A COMMUNICATE EFFECTIVELY & DEVELOP PERSONAL COMPETENCE	DEMONSTRATE COMPETENCE IN BASIC MATH	DEMONSTRATE COMPETENCE IN BUSINESS LANGUAGE	USE ST. METRIC UNITS	PRESENT PERSONAL STANDARDS ACCEPTABLE TO BUSINESS	ESTABLISH & DEFINE PERSONAL DEVELOPMENT GOALS	ANALYZE PERSONAL FINANCIAL OPTIONS	PREPARE BUSINESS CORRESPONDENCE
B MANAGE & DEVELOP EMPLOYEES	ANALYZE JOB & PREPARE JOB SPECIFICATIONS	PLAN & ORGANIZE RECRUITMENT OF EMPLOYEES	CONDUCT BACK-GROUND SEARCH & SUMMARIZE APPLICANTS	CONDUCT JOB APPLICATION INTERVIEWS	MAKE FINAL ASSESSMENT & PLACEMENT OF NEW EMPLOYEES	CONDUCT & COORDINATE INDUCTION & ORIENTATION PROCEDURES	PLAN DISTRIBUTION OF WORKLOAD
C ORGANIZE EFFECTIVE WORK ENVIRONMENT & PARTICIPATE IN GEN OFFICE PROCEDURES	LAYOUT INDIVIDUAL WORK STATIONS	PLAN OVERALL PHYSICAL LAYOUT FOR TRAFFIC, MATERIALS & COMMUNICATIONS FLOW	RESEARCH FOR & IMPLEMENT WORK EFFICIENCY TECHNIQUES	DESCRIBE & STRESS IMPORTANCE OF WORK PROCEDURES	DEVELOP ORGANIZATION CHARTS	IDENTIFY & ESTABLISH PRIORITIES	ESTABLISH & COMMUNICATE ADVANCE PLANNING & TARGETS FOR WORKLOAD
D MANAGE LEGAL & GOVERNMENT REQUIREMENTS	IDENTIFY FORMS OF BUSINESS ORGANIZATIONS	INTERPRET COMPANIES ACT	IDENTIFY CLASSES OF SHARES	PARTICIPATE IN FORMATION OF CONTRACTS	MONITOR & FULFILL CONTRACTUAL OBLIGATIONS	IDENTIFY GROUNDS FOR IMPEACHMENT OF CONTRACTS	IDENTIFY THE STATUTES OF LIMITATIONS
E OPERATE ACCOUNTING SYSTEMS	USE SHORT METHODS TO MAKE RAPID CALCULATIONS	IDENTIFY & CHECK SOURCE DOCUMENTS	RECORD BASIC ACCOUNTING ENTRIES	POST & TRIAL BALANCE GENERAL LEDGER	RECORD, BALANCE & POST CONTROLLING ACCOUNTS & SPECIALIZED JOURNALS	RECORD, POST & ANALYZE ACCOUNTS RECEIVABLE & PAYABLE	PREPARE WORKING SHEETS
F MANAGE FINANCIAL RESOURCES	ESTABLISH CREDIT PROCEDURES & LIMITS	ENFORCE COLLECTION PROCEDURES	ANALYZE BENEFITS OF SHORT, MEDIUM & LONG-TERM FINANCING	INVEST SURPLUS CASH	ESTABLISH CASH REQUIREMENTS	PREPARE CASH FLOW STATEMENTS	NEGOTIATE LOANS
G MANAGE PHYSICAL RESOURCES	KEEP PLANT & EQUIPMENT RECORDS	RECOGNIZE LOSSES DUE TO SHRINKAGE & TAKE CORRECTIVE ACTION	MANAGE & CONTROL OPERATION & MAINTENANCE OF MOTOR VEHICLES	INTERPRET BLUEPRINTS	ESTABLISH & MAINTAIN FIRE PREVENTION PROGRAM	ESTABLISH & MAINTAIN SAFETY PROGRAM	ANALYZE UTILIZATION OF EQUIPMENT
H DEVELOP MARKETING FUNCTIONS	IDENTIFY ROLE & METHODS OF MARKETING	EVALUATE MARKET & BUYING BEHAVIOR	DEVELOP MARKETING STRATEGY	PREPARE & CONDUCT MARKET SURVEYS	ANALYZE FORECASTS TO DETERMINE MARKET TRENDS	DEVELOP & IMPROVE PRODUCT LINE	CONDUCT MARKET TESTS FOR PRODUCTS
I MANAGE PURCHASING OPERATIONS	ORGANIZE FOR & CONDUCT PHYSICAL INVENTORY	ESTABLISH PURCHASING PROCEDURES & DETERMINE RESPONSIBILITY	FORECAST & PLAN FOR PURCHASING	ESTABLISH QUALITY ASSURANCE SYSTEMS	RESEARCH, EVALUATE & SELECT SUPPLIERS	UTILIZE COMPUTERIZED PURCHASING SYSTEMS	PARTICIPATE IN NEGOTIATION OF PURCHASES

Holland College, 1983

Figure 2. Rating Scale


4
C
CAN PERFORM THIS SKILL SATISFACTORILY AND CAN LEAD OTHERS IN PERFORMING IT.
B
CAN PERFORM THIS SKILL SATISFACTORILY WITH INITIATIVE AND ADAPTABILITY TO SPECIAL PROBLEM SITUATIONS.
A
CAN PERFORM THIS SKILL SATISFACTORILY WITH MORE THAN ACCEPTABLE SPEED AND QUALITY.
3
CAN PERFORM THIS SKILL SATISFACTORILY WITHOUT ASSISTANCE AND/OR SUPERVISION.
2
CAN PERFORM THIS SKILL SATISFACTORILY BUT REQUIRES PERIODIC ASSISTANCE AND/OR SUPERVISION.
1
CAN PERFORM SOME PARTS OF THIS SKILL SATISFACTORILY BUT REQUIRES ASSISTANCE AND/OR SUPERVISION TO PERFORM THE ENTIRE SKILL.

Holland College, 1983

2. Program Development

The program for each course is developed by course instructors based on the career profiles. The major source of instruction for each course appears to be the ***Learning Guide.*** One of these is developed for each competency in the course and it contains the following segments:

- rationale for the competency;
- specific objectives called elaborations;
- learning activities;
- resources which consist of printed and audio-visual resources as well as resource persons;
- performance assessment.

3. Resources

Resources for each program are kept in program resource rooms. Written materials are kept in vertical file boxes and these are supported by audio-visual materials such as audio and visual tapes, slides, films etc.

4. The Learning Model

The learning model or process is individualized and self-paced as far as possible. Following an interview and orientation program each student is given a copy of the appropriate occupational analysis in chart form. In consultation with an instructor - advisor the student then plans a career program (which may include all or some of the competencies in the total career profile). Once this is established, learning plans or plans of action (similar to learning contracts) are then worked out (see Figure 3).

Students then work through their learning plans at their own pace following learning activities and using resources set out in the learning guides. They work in realistic work stations or practical rooms (e.g. a model office for Secretarial Arts) or in the appropriate resource rooms. During this stage they are supervised and perhaps interviewed by instructors and are free to seek assistance from any source.

When students feel confident that they can perform the performance assessment task set out in the learning guide, they rate themselves and then have this reviewed by the instructor. When the student and instructor agree on a rating, it is entered on the student's record chart or profile of achievement.

Students enter and exit from the program at any time (upon full or partial completion of the program) and receive on exit a 'Record of Achievement'. (The model is outlined in full in Figure 4)

Figure 3.

LEARNING PLAN

No. ... For .....

OBJECTIVE .....

.....

.....

.....

SKILLS TO BE DEVELOPED .....

.....

Proposed Start Date .....

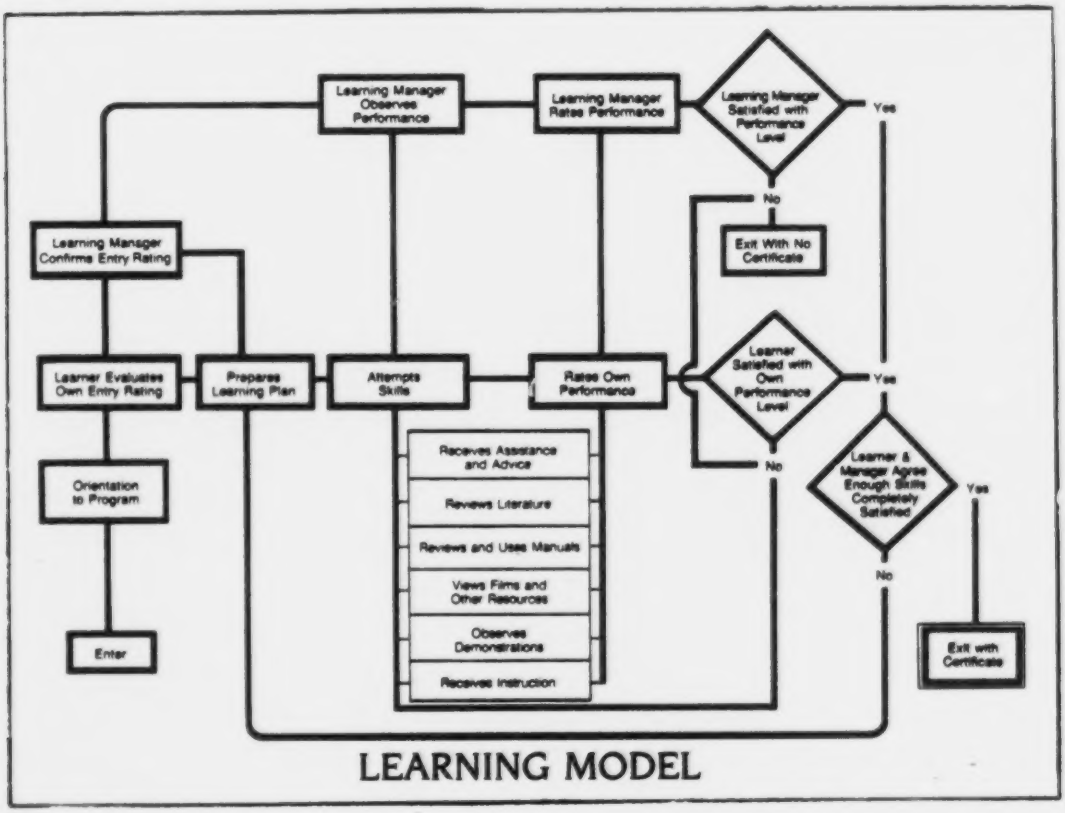
Proposed Completion Date ..... Date Rated .....

Signed by .....
Learner

.....
Instructor

Holland College, 1983

Figure 4.



LEARNING MODEL

Holland College, 1983

OBSERVATIONS

It was reported at Holland that while many students adapt successfully to the system, some do not. The critical element for success appears to be the realization by students that progress only occurs when they do something - that freedom brings an equal amount of responsibility. Those who adapt tend to proceed quite quickly, those who do not, tend to fall behind.

It was also reported that some instructors and some employer groups find it difficult to appreciate and accept the system. Some instructors find it difficult to individualize their instruction and make individual decisions about each student. Some employer groups do not recognize the significance of the Record of Achievement.

As observed by this author the system appeared to be working well in some respects. Students seemed to be working busily and independently while assuming responsibility for their learning. Students interviewed reported that they enjoyed the self-paced methods and could answer questions readily about *'what they were doing now'*, *'why they were undertaking particular tasks'* and *'what they intended to do next'*. Staff interviewed reported that they also enjoyed the system and that the job placement rate for students was high. In other words the system appears to be achieving its objective of helping students to assume responsibility for their own development while acquiring the skills needed to enter employment.

However, certain problems and difficulties were noted. In the first place, most programs observed support their self-paced methods with more and more segments of traditional group teaching. In some cases these segments are continued for several weeks at the beginning of a course before the self-paced materials are used. In other cases, particularly in manual trades areas, they are interspersed throughout the course, often to teach the manual skills. It appears that the learning guides and the related resources are not always adequate on their own. This was very apparent also with the self-paced teacher preparation course where it was admitted that more traditional group sessions were necessary.

In addition there is some confusion over the role of theory and theory testing in the learning sequence. While it was claimed that theory was tested, cognitive (as well as attitudinal) outcomes generally did not feature in the learning guides nor were they apparent in the section on assessment.

Related to this is a somewhat clumsy and time-consuming method of testing and record keeping. In the opinion of this author the system would gain from the introduction of some form of computer-managed learning and record keeping (as well as computer-assisted learning packages). This of course would add considerably to the costs of the system.

CBVE AT NORTHEAST METRO TECHNICAL COLLEGE

Northeast Metro Technical College was also established in 1969 to serve the vocational education needs of nine school districts to the north of St Paul in Minnesota. Courses began in 1971 under the name 916 Area Vocational Institute by which name the college became well known in the USA as a provider of quality competency-based and self-paced vocational programs. The name was changed to the present one in 1989.

From the beginning this college adopted a competency-based approach now called **Personalized Competency-Based Instruction**. Like the STEP system at Holland College the objective of the personalized system at Northeast Metro is to enable students to acquire relevant vocational skills while moving forward at a pace which suits them. The system at Northeast is also based on similar elements and a similar learning model to those employed at Holland College. Courses are composed of units of study which in turn are broken down into tasks or competencies (defined by the relevant industries). These were originally expressed in terms of hours but recently, with some difficulty, have been converted into credit points to bring the college into line with other institutions offering courses by traditional modes.

In addition, there are learning guides or packages for each task. These comprise the basic set of directions and materials required to complete each task. They contain the following elements:

- a rationale statement;
- a terminal objective (called TPO);
- enabling objectives (called micro performance objectives, or MPOs);
- learning steps or directions (one for each MPO);
- lists of resources for each step;
- criterion exams and product/performance checklists.

Resources such as written materials, audio-visual media and flip charts are generally kept in learning resource centres. As at Holland, students work at their own pace in practical rooms or work stations or in the resource centres moving freely from place to place and seeking assistance as required. The criterion exam is a written theory exam obtained in the LRC. The product/performance checklists provide the basis of performance assessment for each task. Instructors are responsible for all testing and recording.

This system is currently used to teach over 50 vocational programs in a variety of occupational areas. The student body is made up of high school students, post-high students and adult extension students, who form the majority. The comments made here are based on observation of the program in action, examination of the learning materials, and interviews with students and staff in a variety of subject areas which included Upholstery, Welding, Graphic Arts, Fashion, Secretarial Studies, Electronics, AV/TV Production and Cosmetology.

There is also a personalized **Learning System** for teacher training. This is made up of a set of self-paced instructional booklets especially designed to train new teachers to work with and develop the competency-based learning materials used at the college. This system is supplemented however by a traditional teacher education program for technical college teachers offered by the University of Minnesota.

OBSERVATIONS

As at Holland College, the CBVE system at Northeast Metro seems to be working well in most respects. Students observed were working independently and with enthusiasm and those interviewed reported that they enjoy the system. Staff also reported that they enjoy the system and that placement rate for students is good. As at Holland the system appears to be achieving the objective of developing responsible students ready for the job market.

Furthermore, some improvements on the Holland system were noted. In the first place, learning packages are more detailed. Terminal objectives are expressed in detail setting out conditions and standards. Theory test and performance test requirements are clear. Enabling objectives and related learning steps are set out in full with resources detailed for each one. These generally involve reading

something (text or information sheet), viewing something (video cassettes, flip charts etc) and doing something (activity sheets). Often many of these learning resources are contained within the package.

In addition, efforts are being made to reorganize the formats of the learning guides to make them easier to follow, especially for poor readers and students with learning disabilities. It was recognized, also, that the learning guides would have to be re-written to incorporate, more clearly, cognitive and affective as well as psychomotor outcomes.

Nevertheless, certain difficulties and problems were noted. As at Holland, most programs at Northeast Metro are supporting their self-paced methods with segments of traditional teaching.This is clearly related to the lack of quality control over the learning packages. The curriculum consultants admitted that because their section had been drastically reduced in staff numbers and in resources, they are forced to concentrate on such aspects of the packages as the appropriateness of objectives and the match between objectives and assessment. They do not have time to check the quality of the bulk of the learning package including the self-paced learning techniques employed.

This has led to a number of weaknesses in the learning packages. In the first place there is no real guarantee that the learning resources (printed or audio-visual) do in fact teach the current and often modified objectives. The curriculum consultants simply do not have time to check through all resources. This problem has been exaggerated by the current move to rewrite learning guides to incorporate cognitive, affective and psychomotor outcomes.

In addition, there appears to be an over-reliance on very long information sheets (3 - 5 pages sometimes) and long video cassettes. There is not enough evidence of basic self-paced learning principles such as the use of small chunks of information or activity accompanied by frequent feedback and self checks. As at Holland, the system at Northeast would probably gain from the introduction of some computer-assisted learning and computer managed testing and record keeping. These improvements , of course , would add considerably to the costs of the venture.

CBVE AT RICHMOND COLLEGE

Richmond College of TAFE in Victoria has become well known for its pioneering work in competency-based education and self-paced learning. The system of training in this college is based on individualised self-paced methods, mastery learning, combined with criterion assessment.

Beginning in a modest way in 1975 with the Panelbeating Trade Course, the college now offers the following courses by the self-paced mode.

a. Apprenticeship/Post Apprenticeship Courses and Hobby Courses

- Motor mechanics
- Panel Beating
- Sheetmetal
- Motor Painting
- Light Engines
- Automotive machining
- Auto Parts Interpreter

b. Community Courses

- Aural Rehabilitation
- Notetakers for the Hearing Impaired
- Interpreters for the Hearing Impaired
- Adult Migrant Skills Course

The comments made here are based on observation of the programs in operation in the automotive trade related areas, examination of resources, interviews with staff and students and descriptions of various aspects of the system contained in unpublished papers generally written by college staff.

Each Course syllabus is developed in co-operation with the corresponding industry and in accordance with the systems model. This commences with a job description which is further broken down into the sub-skills, knowledge, and attitudes (competencies) required to perform the job successfully.

The syllabus is finally written up in terms of performance objectives in which there are three elements:

i. the task to be performed;

ii. the conditions under which the performance will be measured;

iii. the level of competency to be achieved, i.e. the criterion standard.

The students progress through their courses at their own pace as they receive their instruction by means of self-paced learning packages. These units are designed in a variety of media such as slide/tape, flip card, computer-based learning program, printed text or video, so that learners can select the format which best suits their individual learning styles. The self-paced learning units are designed to ensure that learners are actively involved with the instructional materials and are given feedback on the adequacy of their responses. Good use is made of mini-tests and self-checks to test the understanding of theoretical material. The packages are generally kept in resource or facility rooms adjacent to the practical areas.

On the completion of each self-paced learning unit, students are assessed to determine whether they have achieved the criterion standard stated in the objective. If the standard has been reached, they receive a pass and proceed to the next objective. If the standard has not been achieved, the student is able to undertake a different learning sequence and again take the criterion test.

It was reported that the majority of students complete their training in this self-paced learning system to the necessary standard in approximately two thirds of the time taken in the traditional system with its group based instruction. However some students require significantly longer than the prescribed time. Students who complete their courses in below average time may return to their jobs or begin advanced or other related courses.

The college claims that because of this system they have been able to achieve a 25% increase in apprentice completion rate. They have also been able to introduce flexible attendance patterns and a rolling enrolment system with new enrolees filling vacancies as soon as other students leave or complete courses.

OBSERVATIONS

As in other colleges employing this mode of instruction, students observed at Richmond appeared to be working busily and with purpose. Most staff also reported that they were enthusiastic about the system. There were some exceptions to this and this will be taken up later.

One of the most impressive features of the system at Richmond is the implementation of an effective computerised student management and reporting system and the development of effective computer-based learning materials. The

student management and reporting system (SMRS) supports up to 1,000 students and a maximum of 468 objectives. It has been designed to assist instructors to manage individuals or groups of students through a course. The system allows students to record the start and finish of modules while displaying a representation of their progress through the course. It makes extensive use of colour and the ' point at and choose method' of interacting with users.

The computer-based learning materials are based on the AUTHOR System. This basically is a set of programs which allow:

- the writing, storing, retrieving and amending of lessons;
- the creation of graphics and diagrams;
- the use of colour text screens with highlighting of text;
- the testing of lessons and recording of results.

In the opinion of this author the adoption of some form of computer based management and learning system is probably now essential for the implementation and continued development of training systems involving competency-based and self-paced learning.

Another impressive feature of the system at Richmond, is the careful approach to testing. Testing is based on mastery learning and the standards specified in advance are high. On completion of the related instruction or theory module by the chosen media, students attempt a theory test which is computer managed. If successful, they report to an instructor to attempt the performance test. If the specified standard is achieved a ***pass*** is recorded. If not, students try again later after relearning. The system acknowledges no failures - only incompleted work and there is no provision for 50 percent pass marks. In addition, if students believe that they are competent in a particular skill they can elect to do the performance test without working through the related instruction.

One of the worrying aspects and potential problems of the system has been referred to already. This is the impression gained at Richmond as well as at the other two colleges reviewed, that some instructors are not entirely happy and confident working with competency-based and self-paced learning. The environment of such a system does indeed change the traditional role of the teacher. Instead of being a presenter of knowledge with a captive group of students regarded as 'theirs', teachers

have to become facilitators able to individualise their instruction and deal with a variety of students all at different stages on a one to one basis. In addition, traditional course development and administration duties change considerably. All of this can cause some teachers to feel stressed, insecure, frustrated and threatened. Tension within the staff resulting from these concerns has been reported as one of the *'growing pains'* as the system developed at Richmond (Bird, 1982, p.20). It is not absolutely clear that the pain has entirely dissipated.

IMPLICATIONS AND CONCLUSION

In summary it would appear from the review of the three programs in operation that competency-based instruction has a good deal of potential for training in both industry and TAFE in a variety of occupational areas. The CBVE approach appears especially useful in training situations where trainees have to attain a small number of specific and job related competencies. The approach is doubly useful where trainees are widely divergent with regard to ability and previous and concurrent industrial experience. The self-pacing aspect, moreover, appears to develop characteristics of independence and self-reliance which trainees appreciate and generally enjoy and allows the introduction of flexible attendance and enrolment patterns which employers and mature students appreciate.

The review makes it apparent, however, that the CBVE approach, has a number of inherent problems and potential pitfalls and the indications are that it will only fulfil its potential in training and vocational education if it is carefully and effectively implemented. A number of implications can therefore be drawn for TAFE and other training institutions thinking of implementing such a system.

First and foremost is the need for an initial and ongoing commitment to the provision of adequate resources and learning materials. Given the central position allotted to these materials in CBVE, written materials need to be clear and comprehensible for the majority of readers and audio-visual materials need to be properly co-ordinated and related to the written materials. In addition, the learning materials should incorporate the well established principles of self-paced learning, such as:

- the need for small steps;
- the need to match learning activities and objectives;

- the need for continuous student responding;
- the need for immediate and regular feedback.

It has been noted that a failure to properly observe all of these principles led to some breaking down of the system at Holland and Northeast Metro Colleges. In addition, Harris et.al., in their review of a CBVE program in South Australia from 1983 to 1985, noted that student complaints about learning materials and audio-visual resources had become common by 1985 (1987, ch. 4). These authors concluded that for the system to improve, learning materials and especially audio-visual materials would need to be *"polished and more adequately coordinated to ensure clarity, and increase student interest and challenge"*. (1987, p.124). This is an observation which should be kept in mind by any system or institution intending to introduce CBVE programs.

A second implication is the need for adequate preparation and on going staff development for teachers. The difficulties and frustrations which some teachers experience working with CBVE have been noted. In relation to the *'growing pains'* experienced at Richmond, Bird reports that some teachers experienced feelings of insecurity because they felt that their roles were jeopardised by the new system and they did not have the capacity to examine the system objectively (1982 p.20). Harris et.al. observed that by early 1986 many teachers working in the South Australian program reported that they were not personally satisfied teaching in CBVE (1987, p.79). They reported feelings of *'powerlessness'*, *'frustration'* and *'dissatisfaction'* (1987, pp. 79-81). These authors concluded that *"continuing staff development and team building activities be undertaken with both teaching staff and administrators to improve morale and motivation."* (1987, p.124).

In relation to initial teacher preparation, it is clear that if teachers are to work successfully in a CBVE program they will need a thorough course in the principles which underlie CBVE and a good understanding of the procedures necessary for its effective implementation. This would include an understanding of occupational analysis procedures such as DACUM, the nature and scope of competencies in a range of occupational areas as well as an understanding of the accepted principles of self-paced learning.

In addition, successful introduction and implementation of a CBVE program requires on the part of teachers, a real commitment to the values and worth of the

competency-based approach. This objective might be achieved by having the teachers develop competence in the development of CBVE programs and materials. It might also be achieved through the use of videos and films showing CBVE in action. It might be more effectively achieved however, by having the teacher education programs themselves, or parts thereof, taught using the competency-based mode. Performance-Based Teacher Education modules have been developed by the National Center for Research in Education (1982) and by Holland and Northeast Colleges. A more sophisticated way may be through computer-assisted instruction using programs like the one on Performance-Based Instructional Design developed by David Pucell (1989) at the University of Minnesota.

A third implication concerns the preparation of the learners for the new system. Hermann suggests the incorporation of a *"transition period with effective tutoring for the movement of learners from a traditional approach to a CBVE approach"* (1990, p.60) In addition, the benefits and advantages of the system should be continually made clear to both students and employers alike.

Harris et. al. (1987) report that student satisfaction with most aspects of the system remained high in South Australia over the three years, especially with the self-paced learning aspects. However, the general level of enjoyment declined over the three years (1987, p.75). The most frequent complaints concerned the unavailability of staff for guidance and testing and inconsistency in marking. (1987, ch 4). All of this strengthens the impression that some investment in computer-based learning, as well as computer managed testing and recording, along the lines of the system developed at Richmond, is now almost essential for the successful introduction and continued improvement of any significant CBVE program.

Perhaps the most telling point concerning CBVE can be drawn from a conclusion already drawn about performance-based teacher education. Phyllis Caldwell, following a review of competency-based teacher education programs for adult educators, concluded that while *"it is relatively easy to develop lists of competencies, (it is) very time consuming and expensive to develop the training and evaluation packages based on these competencies."* (in Grabowski, et.al.,1981, p.7). This conclusion is just as valid and just as significant for competency-based vocational education.

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